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#2009:01:15 12:23:59### ##Corso di Fisica II
Correzione della prova scritta del II° modulo del 17/12/2008
Esercizio 1

Consideriamo innanzitutto solo la sfera conduttrice carica.
Al suo interno il campo è nullo e il potenziale è costante.
Al suo esterno il campo va come $1/r^2$ e il
potenziale come $1/r$.
Il potenziale all' interno

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e quindi anche al centro
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Si noti il segno meno davanti al termine

dh/dt : questo ci ricorda che il potenziale diminuisce con
 l' aumento dello spessore del dielettrico.
 Infine, per l' energia elettrostatica associata al volume finale di
 dielettrico, integriamo l' espressione
 della densità
 volumica di energia sul guscio sferico considerato.

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Esercizio 2

Nella configurazione considerata la forza magnetica agisce perpendicolarmente al campo magnetico

e

all ' asta del pendolo, è uniforme sulla sua lunghezza e, se vogliamo attribuirle a un punto, è

opportuno considerarla agente sul centro dell ' asta.

L ' espressione per tale forza è

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la corrente del generatore percorre il circuito in senso orario

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positiva la velocità angolare associata al moto antiorario

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positiva la forza magnetica verso destra

Controllando con la regola della mano destra notiamo che quando il pendolo oscilla verso destra gli

elettroni subiscono una forza

dalla massa

verso il perno del pendolo: in termini di

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forma una

corrente diretta dal perno alla massa, opposta quindi a quella del generatore.

La posizione di equilibrio si trova eguagliando i momenti esercitati dalla risultante della forza di

gravità

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agente sulla massa

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e dalla forza magnetica. Consideriamo l'equilibrio statico, ovvero in assenza di velocità angolare.

Otteniamo la relazione

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che, con i dati forniti ci fornisce l'angolo di equilibrio (anch'esso positivo, quindi il pendolo risulta spostato a destra).

Per trovare l'energia dissipata dalla resistenza dobbiamo integrare la potenza dissipata

nell'intervallo di tempo necessario a portare il pendolo dalla verticale alla

posizione di equilibrio
ora trovata. Poiché omega è costante, la potenza dissipata è costante e possiamo
quindi portarla
fuori dall ' integrale.

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A cura di Paolo A.C.

Pac.n@hotmail.it

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